Measuring Canopy and Ground Cover

Topic: Biology/Trees and Plants

Objectives: To calculate percentages of canopy cover and ground cover

Grade Level: 6 - 12

Time: 30 - 40 minutes

Materials: marking stakes, orienteering compasses, 30-meter lengths of rope, homemade densiometers, thermometers, writing pads, pens or pencils

Vocabulary:
canopy
ecosystem
absorption
runoff
densiometer
cardinal direction

Location: North Woods, Front Lawn Grove, Oak Hill, or Park Drive Grove

Background: The canopy and ground cover in an area play an important part in the soil conditions, the runoff or absorption of rainfall, the local temperature, and the types of animal life in a region. In this activity you will measure the canopy cover and types of ground cover in a 30 x 30 meter square of Piedmont Park.

Advance Preparation: Prepare homemade densiometers or have the students make their own.

Procedure:

1. Together with two or three of your classmates, place a marking stake in the ground at one corner of your study area.

2. Have one person stand at this marking stake and firmly hold one end of the 30-meter length of rope. Using the compass for bearing, have another person take the other end of the rope and walk 30 meters due north. Place a second marking stake in the ground at this corner.

3. Repeat step 2, this time walking either due east or due west from the second corner. Place a third stake in the ground 30 meters from the second stake.

4. Repeat step 2 again, but this time walk due south from marker number three. Place the fourth stake in the ground at this corner.

5. Now you have your 30 x 30 meter square staked out. Check your measurements by walking from corner four back to your original position. You should have traveled another 30 meters in the remaining cardinal direction.

6. With another team member, stand at corner number one of your study square. One of you will use the densiometer and the other will record the data on a sheet of paper. Have a third team member stand at corner number three of your study square, the corner diagonally opposite from where you are standing. This team member will be your guide to direct you as you walk from one corner to the diagonal corner.

7. Begin walking diagonally across your square. After every pace (one pace is two steps), look up through the densiometer. Hold the densiometer so that the metal weight is lined up with the center of the crosshairs. Do you see any leaves, twigs or branches at the crosshair intersection? If you do, say, "plus." Your partner then records a "+" sign on the piece of paper. If you see sky at the crosshair intersection, say, "minus" and you partner records a "-" sign.

8. Now look down. Is there vegetation under your right foot or touching your right leg below your knee? If there is, say "G" if the vegetation is green and "B" if the vegetation is brown. The data recorder writes "G" or "B" accordingly. If there is no vegetation under your right foot or touching your right leg below the knee, say "minus" and the data recorder writes a "-" sign.

9. With your guide directing you along the diagonal, continue observing and recording data at every pace until you reach the opposite corner of your study square.

10. Record data similarly for the other diagonal of your square.

11. Now compute the percentage of canopy cover: First count the total number of "+" and "-" signs you have all together. Count both diagonals in this total. This is the number of observations you made. Then count the number of "+" signs you have. Finally divide the number of "+" signs by the total number of observations and multiply by 100. This is the percentage of canopy cover in your 30 x 30 meter square.

12. Next compute the percentage of green ground cover by dividing the number of recorded "G's" by the total number of observations and multiplying by 100. Do this again for the percentage of brown ground cover. Add the percentage of green ground cover and the percentage of brown ground cover to obtain a total ground cover percentage.

Questions to think about and discuss:

1. Use the chart below to classify your study square according to its canopy or ground cover.

Land Cover Classification Chart

Closed Forest	Canopy cover is 40% or more and is formed by trees 5 meters tall or taller. Tops of trees are touching.
Woodland	Canopy cover is 40% or more and is formed by trees 5 meters tall or taller. Tops of trees are not touching.
Thicket	Canopy cover is 40% or more and is formed by woody plants from 0.5 to 5 meters tall. Individual plants are interlocked.
Shrubland	Canopy cover is 40% or more and is formed by woody plants from 0.5 to 5 meters tall. Most individual plants do not touch.
Herbaceous Vegetation	Canopy cover is less than 40% and ground cover is 60% or more.
Barren Land	Canopy cover is less than 40% and ground cover is less than 60%.
Wetland	Ground cover is 40% or greater and ground is constantly saturated during growing season.
Open Water	Vegetation cover is less than 40% and water constantly covers 60% or more of the area.
Cultivated Land	Cultivated plants cover 60% or more of the area.
Urban	40% or more of the area is developed for residential, commercial, industrial or transportation use.

2. How do you think your percentages of green and brown ground cover would change if the season were different? How would the percentages of canopy and total ground cover change? Would your land cover classification change?

3. Compare your study square measurements to those of your classmates. Which study squares do you think are the warmest? Which do you think are the coolest? Test your hypothesis with a thermometer. Discuss how vegetation cover affects local temperature.

4. Comparing your study square with those of your classmates, which do you think would stay damp longest after a rainfall? Which study squares would have the greatest ability to soak up rainfall? To test this hypothesis, you can try the Soil Moisture exercise in the Soils section.

5. What types of animals do you suppose would prefer the different squares that you and your classmates have studied? Can you find evidence to support your hypothesis?